FLIGHT
The AIRCRAFT ENGINEER & AIRSHIPS

First Aero Weekly in the World

Founder and Editor: STANLEY SPOONER

A Journal devoted to the Interests, Practice, and Progress of Aerial Locomotion and Transport

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DIARY OF FORTHCOMING EVENTS

Club Secretaries and others desirous of announcing the dates of important fixtures are invited to send particulars for inclusion in the following list:—

1925

Feb. 12 .... **Colonel F. Searle: "The Maintenance of Commercial Aircraft," before R.Ae.S.**

Feb. 18 .... **Air Chief Marshal Sir H. M. Trenchard, Bart., G.C.B., D.S.O.: (Subject to be announced later), before C.U.Ae.S.**

Feb. 19 .... **Lieut.-Col. L. F. R. Fell: "Light Aeroplane Engine Development," before R.Ae.S. (Society of Arts).**

Feb. 20 .... **Professor E. G. Coker, D.Sc., F.R.S.: "Photo-Elastic Methods of Measuring Stress," before I.Ae.E.**

Feb. 25 .... **H. Richardo, Esq., M.A.: (Subject to be announced later), before C.U.Ae.S.**

Mar. 4 .... **Alan Chorlton, Esq. (Managing Director of Messrs. Beardmore, Ltd.): "The All Steel Aircraft," before C.U.Ae.S.**

Mar. 5 .... **Lieut.-Col. C. B. Heald, C.B.E. (Medical Adviser to the Director of Civil Aviation, Air Ministry): "Some Medical Aspects of Air Transport," before R.Ae.S.**

Mar. 6 .... **M. E. Dewoitine: "The Advantages of Metal Construction," before I.Ae.E.**

EDITORIAL COMMENT.

ELSEWHERE in this issue of FLIGHT will be found the full text of the report of the Court of Inquiry appointed by the Secretary of State for Air to investigate the accident to aircraft G-EBBX at Croydon on December 24 last, in which the pilot and seven passengers lost their lives.

The Croydon Accident

The report does not, perhaps, bring out much that is new, but certain very important statements are made to which we feel attention should be called. The section of the report which deals with the previous history of the machine is valuable in showing the care taken by all concerned, and, incidentally, should effectively contradict certain statements that have appeared in sections of the German aeronautical press to the effect that the machine was old and worn out, and that this was the cause of the accident. It is rather curious that these statements should have appeared in similar form in several journals, the fact almost giving the impression that the statements must have been "inspired" by some person or persons antagonistic not only to Imperial Airways, Ltd., but to British aviation in general.

The facts relating to the return of Hinchliffe to Amsterdam, owing to indications of fluctuating oil pressures, and the subsequent happenings are given at some length in the report, the Chairman of the Inquiry giving his reasons for dealing with these points in detail. He expresses the opinion that on those occasions the trouble may have been not with the oil pressure itself, but with the indicator, which may not have shown the real oil pressures. The fact that the engine power was, apparently, quite satisfactory seems to lend strength to this supposition.

In view of the allegations as to negligence on the part of Imperial Airways, Ltd., the sentence "I am satisfied that every reasonable precaution was taken by Imperial Airways, Ltd., to prevent any detectable defect in the engine being overlooked, and that Mr. Clark was fully justified in signing the daily certificate of safety of aircraft referred to above" is of vital importance, as is also the conclusion that a test flight

before the machine went out again was not, taking into consideration all the circumstances, called for.

The report also effectively disposes of the allegation that the machine was overloaded, and the Court of Inquiry finds that everything points to the engine having been in perfect order. The swelling in the petro-flex tubing observed after the accident is ascribed to the heat from the burning wreck, and the Court does not consider this can be accepted as a possible cause of failure in the petrol supply. It would thus appear that all the commercial interests concerned have been found in every instance to be without blame in the matter, as well as the personnel responsible for the maintenance of the machine.

A considerable amount of space is devoted to the question of the suitability or otherwise of the Croydon aerodrome, and, on the whole, the report does not seem to be impressed by the qualities of the London air terminus. In fact, in the summary of conclusions, it is stated that "The aerodrome at Croydon is unsatisfactory. This was not the primary cause of the accident, and I do not say more than that it may have been a contributory cause." Personally, we have never regarded Croydon as anything but a very poor aerodrome, whether for air race meetings or commercial flying, and have expressed this opinion on more than one occasion, and we, therefore, can endorse the findings of the Court of Inquiry in this matter—at any rate, in a general way. On the other hand, it may be argued that if a machine is not capable of safely getting into and out of Croydon aerodrome it would have small chance of making a forced landing with safety while flying across country, and could scarcely be considered suitable for cross-country work. However bad Croydon may be, it is, presumably, a good deal better than the average field. By this we do not, of course, mean that a large terminal aerodrome could and should be as inferior as any convenient field in which an aeroplane *may* have to land. That would obviously be absurd, and we are in favour of all possible improvements at Croydon. In this connection we should like to place on record as our conviction that when the Beddington aerodrome is added the present sheds should be removed from what will then be the centre of the aerodrome, otherwise the improvements will be of very little value, as the aerodrome will then be very nearly as difficult as it now is. The only advantage of leaving the present sheds would be a saving in petrol used in taxying.

The report recommends that the Air Ministry should consider whether a limit should be fixed for the stalling speed of aircraft carrying passengers. We have not the space here to go into what is an extremely complicated question, but would point out merely that stalling speed *per se* is no criterion of the safety of a machine in landing, and that numerous other factors have to be considered.

Altogether, the official Inquiry does not appear to have taken us any farther, and all that is definitely known is that the machine stalled at a low altitude and crashed nose-on. Thus the accident is one more of those unexplained happenings by which the history of flying has, unfortunately, been fairly frequently marred.

In conclusion, we desire to make a brief reference to the Coroner's inquest at Croydon shortly after the accident, and resumed some time later. One thing that strikes a layman in connection with this inquest is what appeared to be the unjustifiable licence possessed by members of the legal fraternity to make with impunity the grossest insinuations without having to give the fullest proof by evidence upholding those insinuations. Surely it is time the wings were clipped of legal luminaries in regard to putting forward scandalous imputations when they are under no obligation to supply actual evidence to justify these suggestions. If they see fit thus to throw mud without any reasonable justification, then the law should not protect them any more than it protects an Editor who may never have seen some published slander in his paper, for which he is, and in our view rightly so, held reponsible.

[Royal Air Force Official: Crown Copyright reserved.

VICKERS "VERNONS" AT BAGHDAD: Our photograph shows a squadron of twin-engined Vickers-Napier "Vernons" at Hinaidi Aerodrome, Baghdad. These machines are used as bombers and troop-carriers, and are also employed for transporting mails on the Royal Air Force Mail Route between Cairo and Baghdad.

FLIGHT

LIGHT 'PLANE AND GLIDER NOTES

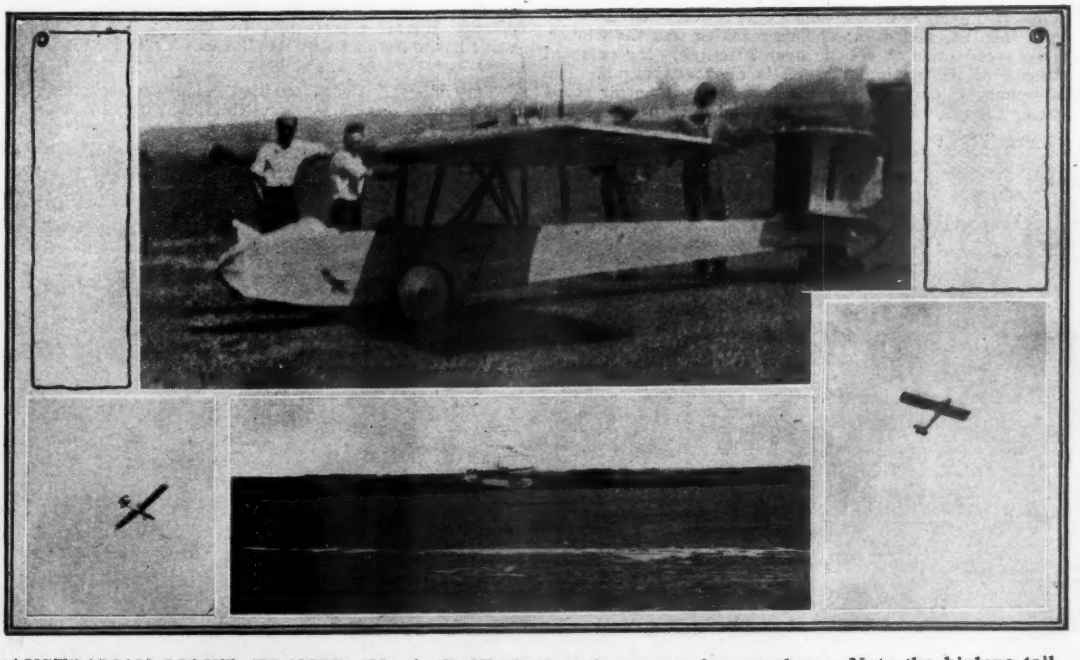
REFERENCE has been made on occasion to the competition for light 'planes held in Australia towards the end of last year. A friend of ours has now sent us a selection of snapshots from the light 'plane meeting and Aerial Derby, as well as a few notes on the machines and their engines. These notes are in no way detailed descriptions of the Australian light 'planes, but taken in conjunction with the photographs it should be possible to form from them a fairly clear idea of the main features of the four Australian light 'planes which took part. Incidentally, it is of interest to record that Hinkler's Avro Baby, with 35 h.p. Green engine, is still going strong, and took part in the New South Wales Aerial Derby. The "Baby" is not now regarded as a light 'plane, but it is at any rate a low-power machine, and in spite of its relatively large engine it does (or used to do) better than 30 miles per gallon at a cruising speed of round about 70 m.p.h.

ONE feature at least the Australian light 'plane competition had in common with ours, or possibly one might truthfully say two features: It was postponed in order to enable constructors to get their machines and engines ready, and the only troubles that were met with were due to refractory engines.

* * *

THE Australian light 'plane meeting took place at the Clarendon aerodrome, Richmond, New South Wales, from November 29 to December 6, and was organised by the N.S.W. section of the Australian Aero Club. Of the four machines that took part (apart from a couple of D.H. 53's flying *hors de concours*) No. 2, the biplane designed and entered by Captain R. W. Reid and piloted by Captain Moody, of the "Quantas," was deleted early in the proceedings by getting into a down draught, making a forced landing and overturning in a ditch just outside the aerodrome. This machine

AUSTRALIAN LIGHT 'PLANES: Two views of the biplane designed by Mr. Broadsmith for Mr. H. W. Ross. This machine won the speed contest at a little over 70 m.p.h. In the left-hand photograph Mr. Ross is seen discussing things with one of his mechanics.



AUSTRALIAN LIGHT 'PLANES: No. 1, the Wackett pusher parasol monoplane. Note the biplane tail. This was the only all-Australian machine, the engine also having been designed by Sqdn.-Ldr. Wackett.

was fitted with a Blackburne "Tomtit" engine, and was generally regarded as a very fine piece of work. Our photograph does not give a very good idea of the machine, but it may be seen that the fuselage was of excellent streamline form, although perhaps somewhat "stumpy," and that the single-bay biplane wings had vee inter-plane struts, the lower plane being smaller in span and chord than the top plane. The Blackburne engine was mounted "upside down" after the fashion set by Mr. Shackleton with his A.N.E.C. monoplane.

* * *

Two machines had been designed for the competitions by Mr. Broadsmith, once associated with the Avro firm in England. These were identified by the design numbers, B.2 and B.4. What happened to B.3 we do not know. The type B.2 was designed for Mr. H. W. Ross, who flew it in the competitions. This machine was a cantilever biplane in so far as it had no bracing of the usual form. The top plane was mounted on centre-section struts rising from the fuselage, while the bottom plane was braced by inverted vee struts after the fashion of the D.H. 53 light 'plane. The engine fitted was an Anzani, and is stated to have given endless trouble. Our correspondent is very enthusiastic about the B.2, and says: "This machine was the winner of the speed prize at a little over 70 m.p.h. My personal estimate of its maximum speed is about 85 m.p.h. The discrepancy is explained by the fact that, at an air speed greater than 75 m.p.h. Ross was blinded with petrol and that he went at least a mile out of his course, this being his first lap. After fixing the defective fuel tank cap he started out to show what the 'bus would do, but the engine—the second one to be fitted—cracked up. The first engine broke its reduction gearing before the machine had been in the air ten minutes. If the engines had not given out Ross undoubtedly would have gained the majority of the prizes. His take-off and climb were phenomenal, speed at least 10 m.p.h. better than anyone else, and landing speed quite moderate."

AUSTRALIAN LIGHT 'PLANES: No. 2, the Reid biplane, with Blackburne "Tomtit" engine, on her first and only flight.

A D.H.53 IN AUSTRALIA: In the cockpit, Capt. F. W. Follett, Superintendent of Aircraft, Civil Aviation Branch of the Department of Defence. Our photograph also shows Capt. Reid, Mr E. J. Hart, Editor of "Aircraft" (in the sweater), Mr. McArthur Onslow (in front of Follett). Capt. Jones, M.C., D.F.C., Superintendent of Flying Operations and pilot of the G-AUAB round-Australia D.H.50, is talking to Col. Brinsmead, O.B.E., M.C., Controller of Civil Aviation.

* * *

THE second Broadsmith-designed machine, the B.4, designed for the owner-entrant, Mr. McArthur Onslow, was fitted with an A.B.C. "Scorpion" engine, which appears to have run perfectly throughout and to have given no trouble whatever. Of slightly more orthodox design than the B.2, with ordinary biplane bracing and struts, this machine gathered-in most of the prizes. In the competitions it was piloted by Captain E. W. Percival, while in the Aerial Derby its pilot was Mr. C. H. Elwin Coles.

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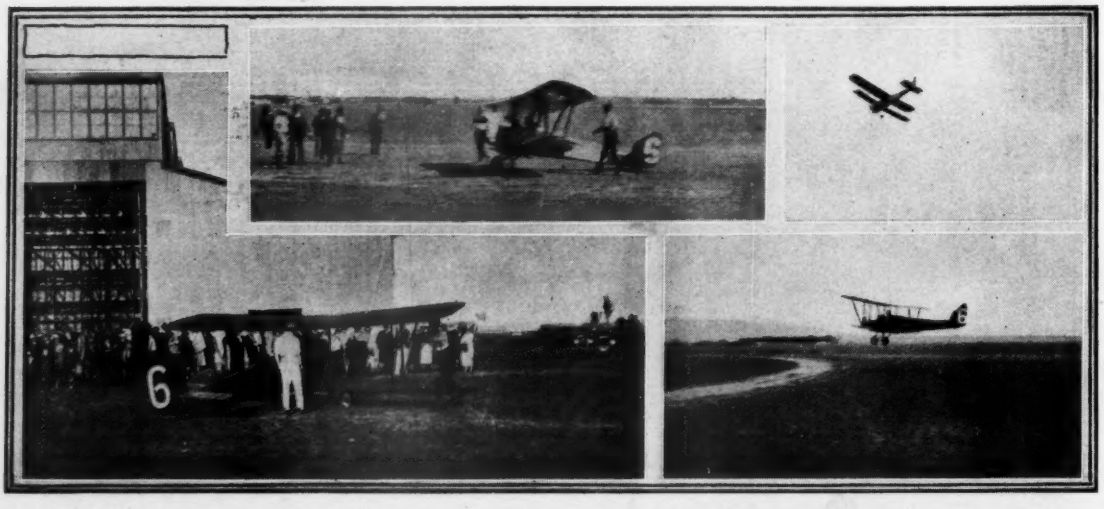
THE only all-Australian light 'plane in the competition was the Wackett monoplane, No. 1, which was fitted with a



AUSTRALIAN LIGHT 'PLANES: Four views of the biplane designed for Mr. Onslow by Mr. Broadsmith. This machine gained most of the prizes. The engine is an A.B.C. "Scorpion."

Wackett engine. The designer of this machine is Squadron-Leader L. J. Wackett, who is Senior Technical Officer of the Royal Australian Air Force and O.C. of the R.A.A.F. Experimental Station at Randwick, New South Wales. Concerning the flying of this machine (which was piloted by its designer), our correspondent waxes enthusiastic and says, "All this pilot's landings were beautiful to watch and, occasionally, sensational. Once he forced-landed at high speed about 80 ft. from a barrier erected to keep the crowd back, ran almost into it and turned right round at the last moment. Another time a piston broke and he landed close to a fence, hopped that, saw a ditch just too far away to get over so bumped down on top of it and bounced clear without any damage."

* * *

THE Wackett monoplane itself is shown in some of our photographs. It is, it will be seen, a machine of somewhat unorthodox design, being practically a monoplane flying boat on wheels. The monoplane wing is mounted high above the fuselage, parasol fashion, and carries on its rear spar the engine which drives a pusher airscrew. By detaching four struts the wing may be pivotted on the cabane, the folded dimensions being about 7 ft. by 33 ft. The Wackett engine is a two-cylinder horizontally opposed of 1,490 c.c. capacity. It was far from being properly tuned up for the competitions, and so did not allow the machine of doing as well as it otherwise would have done. In spite of this, however, Squadron-Leader Wackett managed to put in a good many hours' flying during the week. The biplane tail is a curious feature of this machine. The fuselage is arranged for two seats, but owing to the sulky engine no passenger flights were made.

* * *

TAKING into account the fact that the four machines competing were privately owned, and were designed and built in spare time, the results appear to have been very encouraging, and we congratulate our Australian fellow-enthusiasts on their first light 'plane meeting. There is reason to believe that many more will follow, and at present suggestions are on foot for holding a light 'plane meeting at Brisbane next Easter, and for repeating the Richmond one at the end of the year. By Easter three or four more light 'planes not completed in time for the Richmond week in December should be finished and tested, and those that took part should by then have been made considerably more reliable. We take this opportunity of wishing them every luck "down under."

LIGHT 'PLANE CLUB DOINGS

WE shall be pleased to have reports regularly from Club Secretaries, or those directly connected with new Light 'Plane Clubs, so that by keeping our readers informed on this matter the whole movement may be helped forward to the benefit of the clubs and the popularising of "that Air feeling."

We have received the following reports on the progress being made :—

The Lancashire Aero Club:—The annual general meeting will be held on Thursday, February 19, 1925, in the Milton Hall (Lecture Hall), Deansgate, Manchester, commencing at 7 o'clock in the evening. The committee have decided that in the interests of the club, all newly-joined members shall be eligible to vote at this meeting.

Some of the items of business are the passing of accounts, report on the year's work, and the election of officers. The rules of the club, as drawn up at the first general meeting, will be read.

Election of Officers.—The president and vice-presidents are to be re-elected at the meeting.

The committee serve for two years, one-half retiring annually, as provided for in Rule 6. This being the end of the first year of the club's existence, four of the seven present members of the committee have been decided upon by lot, and retire immediately after the general meeting. Retiring members (in italics in the accompanying list) are eligible for re-election. Messrs. Lacayo, Salthouse, and Williams continue in office.

The following is a list of all the members who are eligible for election to the committee :—

Messrs. *Ainsworth, A.*; Ainsworth, G. F.; Alderley, H. F.; Alker, T. E.; Allison, F. H.; Arnot, W. D.

Messrs. Bailey, H. H.; Barker, A.; Barrow, T. F.; Barran, F.; Bartram, W.; Bayliss, H. C.; Bedford, J.; Belcher, L. C.; Benson, A.; Benson, T. J.; Bloor, E. N.; Booth, F.; Broadhurst, F.; Buckley, J.

Messrs. Caldecott, W. D.; Cantrill, J. C.; Chadwick, E.; Charnley, F.; Child, A. F.; Chiotides, S. E.; Clarkson, R.; Clarkson, W. E.; Clavey, T. E.; Clift, S. N.; Cocking, T. E. P.; Cohen, S.; Cowan, R.; Crabtree, S. A.; Davies, D.; Drew, G. A.; Duigenan, A. H.; *Dyson, D. F.*

Messrs. Edgley, T. H.; English, J. J.

Mr. Foreman, J. D. M.

Messrs. Gerrard, D. C.; Girrell, P. N.; Goodfellow, A.; Goodman, J. W.; Goodyear, A. A. L.; Grant, H. S.; Groves, J. O.; Gunton, F.

Messrs. Haighton, E. A.; Hall, J. P.; Hampson, H. B.; Hampson, H.; Hampson, T.; Hancox-Emery, F. G.; Hargreaves, A. H.; Harrison, J.; Hartley, J. S.; Heaps, C.; Hicklin, W. O.; Hilton, J. R.; Hobson, S.; Hodson, R. M.; Holker, W. A.; Hollows, L.; Hope, C. W.; Howarth, A. L.

Messrs. Jackson, R. P.; Jackson, R. W.; Johnson, A. S.; Jowett, H. J.; Jowett, W. C.

Messrs. Keegan, T. J.; Kershaw, J.; Knudsen, H. J.

Messrs. Lamb, P.; Larsen, O. G.; Laurie, K. S.; *Leeming, J. F.*; Leigh, J.; Lister, H.; Lloyd, E. M.; Lomax, E. B.

Messrs. McIntree, A. R.; Maden, R.; Mainwaring, H.; Mallalieu, E. L.; Messulam, R.; Miede, E. R.; Millington, L.; Moore, R. B.; Morley, A. R.; Morris, S.; Moss, G. R. Mottershead, H. A.

Messrs. Newbold, P. H.; Newton, C.; Nicholson, T.; Noblett, J. C.; Nuttall, R.

Mr. Overton, C.

Messrs. Parish, W. J.; Parker, C. A. S.; Parker, W. A.; Pearson, L.; Percival, H.; Perfect, R. V.; Pickup, E.; *Prince, T.*; Provis, C. W.

Messrs. Radley, J. E.; Ramsden, W. A.; Renshaw, D.; Ricketts, H.; Ridgeway, R.; Riley, J.; Roberts, E. C.; Robinson, A.

Messrs. Scholes, J.; Seddon, G. A.; Shenton, J.; Shufflebotham, W.; Smart, C. D.; Smith, H. C.; Smith, J. B.; Stephens, J. C.; Stern, H. S.; Stockton, E.; Stockwell, F. H.; Stonex, W.

Messrs. Talbot, J. B.; Taylor, C.; Taylor, R.; Thatcher, E. H.; Thistlethwaite, H.; Tiplady, P.

Mr. Valentine, W. S.

Messrs. Wade, R. L.; Watts, R. W.; Whitehurst, A.; Whitelow, N. McL.; Whittaker, C.; Wild, F.; Wilkinson, Dr. J. F.; Wilkinson, W. F.; Williams, E. G. L.; Wood, C. G.; Woodhead, R.; Wyler, Dr. M.

Inter Air Club Conference.—A Conference of the Clubs approved by the Air Ministry, was held at the Queen's Hotel, Leeds, on Saturday, February 7, 1925, at 5 p.m. The following clubs were represented :—The Royal Aero Club, The Lancashire Aero Club, The Midland Aero Club, The Newcastle-on-Tyne Light Aeroplane Club, and The Yorkshire Aeroplane Club..

The representatives of each Club were as follows :—

Royal Aero Club.—Lt.-Col. M. O. Darby and Commander H. E. Perrin.

Lancashire Aero Club.—Messrs. C. J. Wood, V. F. Dyson, J. F. Leeming.

Midland Aero Club.—Major Gilbert Dennison.

Newcastle Light Aeroplane Club.—Messrs. W. B. Ellis, and J. Bell.

Yorkshire Aeroplane Club.—Professor Brodetsky, Messrs. Stuart A. Hirst, W. L. Oldroyd, Capt. N. Blackburn, Sq.-Leader R. J. O. Compson, D.S.O., D.F.C. The following members of the Committee of The Yorkshire Aeroplane Club were also present to welcome the delegates :—Messrs. E. T. W. Addyman, G. Ely, T. Hayes, T. Bates, and J. F. Barnes.

The Clubs submitted reports giving details of their progress which were considered by the meeting to be very satisfactory. Apart from the question of the evolution of a satisfactory and sound financial scheme, it now remains for the production of a machine and suitable engine to enable operations to commence.

Mr. Stuart A. Hirst proposed, "That this Conference of representatives of the London and Provincial Clubs cordially thank Lt.-Col. M. O. Darby and Commander H. E. Perrin, for the efforts they have made to secure co-operation of a satisfactory nature from the Air Ministry and the Treasury, and that they be requested to continue the negotiations with a view to securing sound financial arrangements."

This proposition was carried unanimously. A vote of thanks to the Chairman concluded the proceedings.

A NEW AIR MAIL

1,000-Mile Coastal Route in South Africa

By CAPT. J. L. CARLIN (Late R.A.F.)

THOUGH South Africa has been a very long time making up its mind, now that the country has at last decided to get busy in the matter of air mails the thing is being done with commendable thoroughness, and on a scale that will compare with any of the major mail services of the world.

On March 2 the service will commence operations, and the zeal with which the new Labour Minister of Posts and Telegraphs, Mr. T. Boydell, has attacked the subject is evident when it is stated that the whole active service squadron of the Union Air Force has been seconded for the civil work. Only a training flight will remain at the Zwartkop aerodrome near Pretoria, which is the headquarters of the force, and this flight will continue the work of giving refresher courses to members of the reserve.

The route—between Durban and Cape Town—is practically 1,000 miles long, and is unique in the respect that it is a coastal route pure and simple, and is to be operated with ordinary military D.H.9's. These machines were the gift of the Imperial Government to the Union after the War, and ten of them will be used, two being spare machines. The Union Air Force has said on several occasions that it is ready to operate this route at six weeks' notice only. When it is remembered that there are five bases on the route, at each of which only a comparatively unused aerodrome is available with no hangars or equipment, it is evident that the Force had the confidence born of good organisation in declaring itself so ready to get quickly on to the job. For the Air Force has been kept to its word. On Friday, January 16, word came of the Cabinet decision to operate the route, and on March 2 the first trip will be run.

Two machines will carry the mails on the relay system. Only the ordinary observer's seat will be available, and will carry 400 lbs. or 20 cub. ft. of mail matter. Guns and bomb gear have been removed, but no structural alteration has been made in the 'planes, for their character of military machines is to be retained as far as possible.

The service is to be a three months' trial to provide data which it is hoped will show that a civil company, employing commercial machines of more than twice the load capacity, will find the route payable without too heavy a subsidy or—if such a thing is yet possible—with none at all. The great standby of the service will be the European mail to Durban. The mail boat arrives in Cape Town on Monday morning early, and the air mails will be at Durban that evening. The outward mail boat leaves Cape Town on Friday at 4.30, and to catch this the 'planes will leave Durban with the outgoing mail at 5 a.m. This gives Durban ample time to get replies away by the return mail, whereas by the existing system it is impossible for the outward mail to catch Friday's boat. Durban has been accustomed to waiting a week longer for the answer to a letter than the other large towns of the Union.

The other bases where stops will be made and the mail bags changed to fresh machines will be at East London, Port Elizabeth and Mossel Bay. There are emergency landing grounds at Umtata in Natal and at George near Mossel Bay. It is hoped that a satisfactory inland mail traffic will spring up between these five important harbours, and, were it not for the fact that the use of military machines makes it impossible, there is no doubt that a substantial passenger traffic could be handled. This traffic would be of much value to a civil company. It is recognised that with the machines available there is little hope of making the service a financial success, especially without the considerable revenue that passengers would bring. Sensibly enough, no attempt has been made to make the surcharge fees unduly high in an effort to counteract this situation. The organisation will concentrate on showing that the thing can be done and that the traffic is available, leaving the question of cost to those more qualified to consider it.

The sum estimated for the three months' trial is £9,000, which represents the extra cost of maintaining the active service squadron at the coast instead of at their base, the cost of transporting men and equipment, and the running cost of the service so far as it exceeds the cost of the normal flying done by the squadron. The service is fortunate in having for its directing genius Col. Sir Pierrie van Ryneveld, K.B.E., D.S.O., the hero of the Cairo–Cape Town flight. He is, of course, the Union Director of Air Services, and has shown himself a most economical, yet efficient administrator of the small force and the minute amount of money he has had at his command. This bold experiment by South Africa, conducted as it will be with unsuitable machines along a sea coast that is very stormy in the winter and very rugged indeed in its configuration and over a very considerable distance, will be watched with interest by all interested in the future of aviation. Africa is a continent where aviation may well see great development, and this earnest, though belated, effort is regarded as a real attempt to set that progress going at last.

The time-table of the mail service is officially given as follows :—

Cape Town to Durban

Leave Cape Town, Monday, 8 a.m.
Arrive Mossel Bay, 10.30 a.m.
Arrive Port Elizabeth, 1 p.m.
Arrive East London, 3 p.m.
Arrive Durban, 6.35 p.m.

Durban to Cape Town

Leave Durban, Friday, 5 a.m.
Arrive East London, 8.20 a.m.
Arrive Port Elizabeth, 10.20 a.m.
Arrive Mossel Bay, 12.50 p.m.
Arrive Cape Town, 3.35 p.m.

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Sir Sefton Brancker Starts for Home

ALAN COBHAM having flown from Calcutta to Rangoon—where he arrived on February 6—on the D.H. 50 (Siddeley "Puma"), to join Sir Sefton Brancker, a start for the long journey home was made from Rangoon on February 8. They arrived at Akyab at 2.45 that afternoon, and resuming the flight the following day, arrived safely at Calcutta.

The French Saharan Flight

As reported last week, the De Goys mission, which is flying from Paris to Bangi and back on two four-engined Blériot biplanes, piloted by Capt. Pelletier d'Oisy and Col. Vuillemin, left Adrar, Tuat, on February 3, and flying in three daily stages, reached Gao, on the Niger, on February 5, a distance of 940 miles. They made halts at Wallen and Tessalit. They resumed their journey on February 7, and flew another 250 miles to Niamey. Up to this point they have covered about 2,750 miles in three weeks.

The Paris-Dakar Flight

ALTHOUGH they only just failed by a matter of 460 miles to carry out their object—a non-stop flight from Paris to Dakar, a distance of 2,700 miles or more—Capt. Lemaitre and Lieut. Arachard have, nevertheless, accomplished a truly magnificent flight. Particulars of this flight appeared in last week's issue, so we need only refer here to the actual attempt made last week. They left Etampe's aerodrome at 11.30 a.m. on February 3. The Breguet XIX A.2, fitted with a 480 h.p. Renault, was naturally slow in taking off with its 550 galls. load of fuel on board, but once in the air it climbed steadily to an altitude of 3,000 to 4,000 ft., as it made direct for Spain. At 1.30 a.m., on February 4, they passed over Casablanca, and then about 28 hours after their departure, they landed in Mauretania, near the River Ouro, only some 560 miles from Dakar. They had actually covered 2,485 miles, and thus failed to beat the world's distance record (held by Lieuts. Oakley Kelly and Macready) by 35 miles! Hard luck! However, for their splendid effort they have been given permanent rank of Captain. On February 5 they continued their flight to Dakar, and on February 7 proceeded to fly on to Timbuctoo, but were forced by engine trouble to land at Kayes on the Senegal river, 460 miles from Dakar.

London-St. Moritz Flight.

LIEUT. LESLIE HAMILTON, flying the Martinsyde F6, originally owned by F. P. Raynham, made a fine flight from Croydon to St. Moritz—a distance of 450 miles—on January 29. He made stops at Paris, Zurich, and Chur, and his actual flying time was about 8 hours.

FLIGHT

THE CROYDON ACCIDENT

Official Report

Following is the text of the official report of the Court appointed to investigate the accident to the aeroplane G-EBBX, which crashed at Croydon on December 24. The Report is signed by Sir Arthur Colefax, K.C., Professor B. Melvill Jones, A.F.C., Mond Professor of Aeronautical Engineering at Cambridge University, and Mr. J. Swinburne, M.Inst.C.E., F.R.S. :—

I have the honour to submit my report of the formal investigation which you appointed me to hold of the accident which occurred on December 24, 1924, at or near Croydon, Surrey, to the aircraft G–EBBX. Prof. B. Melvill Jones, A.F.C., and Mr. J. Swinburne, M.Inst.C.E., F.R.S., who were appointed by you to act as assessors for the purpose of such formal investigation sign the report.

The accident occurred shortly after noon on December 24 last, within a few minutes of leaving the aerodrome at Croydon, and resulted in the loss of the lives of all the passengers, seven in number, and of the pilot, Capt. D. A. Stewart, and the destruction of the aircraft.

The certificate of registration, No. 1082, dated June 10, 1924, describes the aircraft as an 11-seater biplane of the type D.H.34, having one engine, a Napier "Lion." The De Havilland Aircraft Co., Ltd., were the constructors, and Imperial Airways, Ltd., the owners of the aircraft.

The certificate of airworthiness, numbered 587, and dated November 18, 1924, gives as the power of the engine at ground level 440 h.p. at 2,000 r.p.m. The maximum total weight, including all items of load, authorised by such certificate, is 7,200 lbs., out of which the tare weight is 4,674 lbs., and the load with full tanks (freight, passengers, goods, etc.), 1,376 lbs.

In November, 1924, between the 7th and the 15th, for the purpose of obtaining a renewal of the airworthiness certificate, the machine was dismantled, the component parts examined, and with necessary replacements, again assembled, the work being carried out under the inspection of the Aeronautical Inspection Directorate. As is usual where a machine has been dismantled, the inspection included a petrol flow test. The aforesaid certificate of airworthiness was issued on the recommendation made on such inspection. Prior to its issue a flight test was carried out by the owners, as is usual on such an occasion, although the directions issued pursuant to the Air Navigation (Consolidation) Order, 1923, do not require this to be done.

Between the date of the certificate of airworthiness and December 18 the aircraft was in frequent use, carrying passengers and freight, and the maximum authorised weight was approached very closely on more than one occasion. Its performance was satisfactory.

On December 18 the aircraft with Mr. W. G. R. Hinchliffe as pilot flew to Amsterdam in very good time. The record of the engine revolutions given by the tell-tale device, which was a new instrument supplied in October or November, was particularly good. On arrival at Amsterdam Mr. Hinchliffe, however, reported to the flying mechanic employed there by Imperial Airways, Ltd., that the engine was rough and that the oil pressure had fluctuated. A refuelling inspection was carried out, special attention being paid to the oil supply, and the aircraft left for Croydon, but returned to Amsterdam after about an hour's flight, the pilot again reporting low oil pressure and a rough engine. The oil filters were emptied and washed, a subordinate observing, as he believed, although this was not otherwise confirmed, some white metal. In this he was probably mislead by the appearance of air bubbles in the oil filter. A test flight was then made, the mechanic, who at one time had been an officer pilot in the Royal Flying Corps, going up with Mr. Hinchliffe. Except for a little roughness—which, in the mechanic's view, was due to the gusty weather and to a possible slight fault on one or two of the plugs—he was satisfied. He, in fact, did find later that two or three plugs were doubtful, and changed all the plugs. The oil pressure, he states was entirely normal ; it dropped to approximately 50 lbs. on the engine being throttled back, and increased perfectly normally and steadily when the throttle was opened again to full power. After this flight test a practically full inspection of the engine and aircraft was carried through. On the 19th Mr. Hinchliffe started again for Croydon, but owing to bad weather combined with roughness of the engine, and fluctuating oil pressure, returned again after about an hour's flight. The mechanic again made a thorough investigation, after which he reported the engine as fit to fly to Croydon. He formed the opinion that the low oil pressures observed were to be attributed to the oil congealing in the pipe leading to the indicator, and then contracting between the stoppage and the indicator. He had had experience of this before on another machine. The engine was giving its normal revolutions, although oil pressure as low as 25 lbs. was reported by Mr. Hinchliffe as having been observed. A fog coming up, which rendered flying impossible, the mechanic again made a very detailed examination of the oil system, and at all parts thereof obtained a satisfactory oil flow. Further, he examined the castings for any possible cracks. As the fog continued and detained Mr. Hinchliffe at Amsterdam, the mechanic seized the opportunity of making what he has described as a total inspection, which he did between December 20 and 23. The controls and cables were relubricated, the petrol system inspected, and the petrol pipes at the unions immediately adjoining the float chamber disconnected. Adopting the words of the mechanic in his evidence, no foreign matter was found, no foreign liquid, and on turning on the petrol at about 1¼ lbs. pressure a full-bore flow from each of the petrol pipes at the joint next the float chambers was obtained. He ran the engine up on the 22nd and also on the 23rd, and was perfectly satisfied.

I have set forth at length the facts, as I find them, as to what happened at Amsterdam, because the attempt and abandonment on two occasions of the return journey to Croydon, and the pilot's reasons for abandoning these attempts, are matters which have been pressed against Imperial Airways, Ltd. Whether there really was any defect in the oil supply to the engine at any time, or whether some cause preventing the indicator showing the actual oil pressures is the true explanation of the pressures observed by Mr. Hinchliffe, may be open to some doubt, but I lean strongly to the latter.

On December 23 Mr. Hinchliffe flew with one passenger to Lympne, *via* Ostend. He broke the journey at Lympne because of the weather and darkness. In an hour's flight on the 24th he completed the journey to Croydon, arriving at the aerodrome there at 10.30 a.m. He then wrote out his report, in which he described the engine as very rough and stated that the oil pressure was "undulating low," but that for the last 60 minutes—presumably the time of the flight from Lympne to Croydon—it had not dropped below 58 lbs. The tell-tale record of the revolutions of the engine, referred to above, includes all the journey from Amsterdam to Croydon, but for the last half-hour of the flight from Lympne to Croydon it can no longer be read. This is not due to deliberate erasure, but has been caused by this portion having been exposed to considerable friction in the handling which the chart has had. It is not an infrequent occurrence for a pilot to describe an engine as rough. It is vibration which he notices, but this does not point to any particular defect, or indeed necessarily to any defect, in the engine, but may arise from other causes, as, for instance, any want of balance in the propeller. Mr. Hinchliffe landed at Ostend for petrol and oil. He stated in his evidence that he left Amsterdam in a gale, and that the time taken to Ostend was extremely long, the longest he had ever taken. The time of the flight was thus prolonged, doubtless by reason of the wind being adverse. The oil undulations, to use his own words, were slight but nothing serious, just as in his flight out from Croydon to Amsterdam, and the power of the engine was excellent. Still quoting from his evidence, the oil indicator was undulating, fluctuating slightly, but only as on his journey from Croydon to Amsterdam, and did not drop below 58, which was quite a normal reading. Such fluctuations in the indicated oil pressure as were observed in conjunction with the roughness he noticed in the engine—the two together—tended, he said, to make him a little more careful. With regard to the flight from Ostend to Lympne, he gave it in evidence that the power of the engine was excellent and that the fluctuations in the oil pressure indicated were just as before ; and with regard to the flight from Lympne to Croydon on the 24th, that the engine was just the same as it had been from Amsterdam to Ostend, and from Ostend to Lympne, and that the oscillations of the oil indicator still continued, not dropping below 58. With these facts in mind, Mr. Hinchliffe wrote out the report to which I have already referred. Before doing so he reported to Mr. Stirling, the foreman of day maintenance, in the presence of Maj. Brackley, the air superintendent of Imperial Airways, Ltd., that the engine was rough and that the oil pressures had fluctuated. After writing out the report he also spoke to the mechanical superintendent, Mr. Hall, telling him of the roughness of the engine and the fluctuations in the oil pressures indicated. The tell-tale record for the flight from Amsterdam has been carefully examined by witnesses who have been called before me, and on their evidence I find that not only is nothing indicated as wrong with the engine, but that, looked at as a whole, it shows that the engine behaved remarkably well.

At Croydon on the morning of December 24, after the aircraft was handed over by Mr. Hinchliffe, Mr. Stirling opened the throttle fully and found the revolutions to be 1,875. He switched off one magneto and then the other to test the plugs, and found them to be in order. He took notice at all speeds at which the engine was running whether there was any undue vibration, without detecting any. The oil pressure he found to be 60 lbs. His conclusion was that the engine was "splendidly built and in good condition." In addition to the re-fuelling inspection, the oil tank was examined to see whether any trace of white metal could be found, but none was found. This re-fuelling inspection, as also the examination of the oil tank, was done under the supervision of Mr. Clark, who also holds a ground engineer's licence. He found everything was normal. He then started the engine and after warming up ran it at fully open throttle, trying each ignition switch. He then throttled down slightly and shut off one petrol tank and opened the engine again to full throttle, afterwards making a similar test of the other petrol tank supply. Mr. Clark also examined the tell-tale record referred to above, the portion covering the last half-hour of the flight from Lympne to Croydon on December 24, being then readable. He attributed the roughness which Mr. Hinchliffe had reported to the atmospheric conditions of the flight to and from Amsterdam, and it should be observed that there is no evidence of any roughness of the order which would result if any of the cylinders were not working, and also that no drop in revolutions occurred which must have been the case if any of the cylinders failed to operate. He signed the daily certificate of safety of aircraft, such certificate in form complying with the requirements of the Air Navigation Directions, paragraph No. 37 (*a*), (*b*) and (*c*) of A.N.D. 3.

In setting forth, as I have done, at length the facts as I find them which relate to the inspection of the aircraft at Croydon on December 24, I have had in mind the contentions as to negligence on the part of Imperial Airways, Ltd., which have been urged before me. I am satisfied that every reasonable precaution was taken by Imperial Airways, Ltd., to prevent any detectable defect in the engine being overlooked, and that Mr. Clark was fully justified in signing the daily certificate of safety of aircraft referred to above.

I have given careful consideration to the question whether the circumstances demanded, as a matter of prudence, that a test flight should have been made before the flight with passengers was undertaken. It is difficult, if not impossible, to imagine anything amiss with the engine, or its installation, or otherwise with the aircraft, which a test flight could have been expected to reveal which the flight from Amsterdam to Croydon had not afforded ample opportunity of revealing. In my judgment the facts as to that flight did not call for more being done than that the ground test should be made, as I find it was, with careful attention to the two matters which Mr. Hinchliffe in writing and otherwise had referred to. Ground tests satisfactorily established that there was nothing wrong with the lubrication, and confirmed Mr. Hinchliffe's view that in the matter of power the engine was excellent. Accordingly, I find that a flight test was not called for, and that it was in no way negligent or imprudent to embark upon the flight with passengers without making such a test. I need say nothing about the circumstances in which a flight test is deemed desirable, and is made, except that they did not exist in the present case.

Before starting on December 24, Captain Stewart made his own examination of the aircraft, ran the engine up to full throttle, and signed the pilot's certificate of general fitness of aircraft before flight. He had been told previously by Mr. Hinchliffe of the latter's experience of the machine. He was both an experienced and skilful pilot, and no blame is attributable to him.

On December 24, another machine, also loaded so as to be within a few pounds of the maximum authorised total weight, with Captain Barnard as pilot, started from the Croydon aerodrome for Paris about a quarter of an hour after Captain Stewart had left. This machine was also a D.H. 34 type, and had a Napier "Lion" engine, similar in all respects to the engine of G-EBBX. When almost half a mile south of the fence which forms the southern boundary of the aerodrome, this machine came within 20 ft. of the ground. Captain Barnard, in his evidence, has said that he experienced a considerable down draught which came over the crest of the hill, which is about 80 ft. higher than the ground at the southern boundary of the aerodrome. He also stated that owing to the wetness of the ground his run along it was somewhat longer than usual, and that the down draught caused him to lose height between the fence and the place where he came so near to the ground.

Captain Stewart's take-off was observed by several of the witness, of whom Captain Barnard and Mr. Clark were not more than 25 yards to the west of the course of the take-off which was in a southerly direction. The run along the ground was unusually long, doubtless because of the wetness of the ground, although possibly intentionally prolonged in order to have a greater speed at the moment of leaving the ground. The machine passed about 25 ft. above the fence, which is about 6 to 7 ft. high. It was stated that the climb was good, and that the machine, at one time, was some 500 ft. above the level at

which it left the ground. There is some divergence of view as to the course of the aircraft, but, in my view, only in unimportant respects. It is established to my satisfaction that after pursuing a course in a direction more or less east of south which took it over the railway which passes through Purley, it turned and followed a course in a direction more or less west of north. I have had the opportunity of seeing from a very good view point the country over which it passed. I am convinced that the turn was taken with the object of landing. I have also come to the conclusion that a height was reached which, if all had continued to go well, would have permitted the aircraft to continue on its way; but that from or shortly before the turn it lost height, until when over the place where it crashed, it was about 100 ft. above the ground. The dive to earth was due to loss of control combined with a stall.

That something went wrong is certain, but it is impossible to say whether it was the engine, its installation, or some other part of the aircraft. I think that whatever was wrong caused the machine to lose height, or induced the pilot to descend at least from the turn onwards. There was no defect in the lubrication. The engine was carefully examined after the accident and not only was nothing found suggesting that the lubrication had become in any way defective but everything pointed to its being in perfect order. The ignition system, namely, magnetos, and wiring, was practically destroyed by the fire which ensued on the crash of the machine, but it was possible to determine that all the wires had been connected in their proper order and proper place. Only three of the sparking plugs failed to work satisfactorily on test, and as to these, there is good ground for the view put forward in the evidence that this failure was due to injury after the accident. Captain Stewart had not put out the aerial of the machine; and it was suggested that it might be he was unable to do so, and that this had caused him to return towards the aerodrome. Even assuming that a pilot would put out his aerial so soon, this suggestion takes no account of the loss of height nor of the particular turn taken.

For some time the investigation seemed to point to the supply of petrol to the carburettor serving the four cylinders on the starboard side having become obstructed by reason of the gut lining of the petro-flex tubing between such carburettor and the filter becoming swollen with water and displaced. A portion of this tubing was found after the accident, and Major Cooper's examination of the same disclosed the fact that just about the lowest point of the bend of this pipe it was practically completely blocked for a length of several inches. I am, however, convinced from the experiments which have been carried out, of which I have had evidence, that water cannot produce any substantial swelling of the gut, but that if the petro-flex piping is subjected to heat, as was the case when the fire ensued after the machine crashed, the gut lining comes away from the canvas backing to which it is glued, and shrivels, and that the pipe becomes similarly blocked. Accordingly, failure in the petrol supply due to the obstruction in this pipe, which was discussed after the accident, which for a time seemed as if it might be the explanation, must be rejected as a possible cause. The blocking of this pipe found by Major Cooper occurred after and not before the accident. I may add that the bore of this pipe was ample to give a full supply of petrol for the four cylinders which it served.

It has transpired in the evidence that on December 6, 1923, the Petro-Flex Tubing Co., Ltd., the only manufacturers of the tubing referred to in the last preceding paragraph, received from the Research Department of the Air Ministry an intimation that internally-wired petro-flex piping in long lengths was approved for civil aircraft, and should in future be supplied unless otherwise specified. This fact was not brought to the notice of the officials of the Air Ministry responsible for the inspection of aircraft prior to the issue of the certificate of airworthiness, and at the time of the inspection in November, 1924, when the piece of piping above referred to was fitted or put back, which, in fact, was not internally wired, the officials conducting such inspection were unaware of the conclusion reached in December, 1923, by the Research Department of the Air Ministry. I refer to this matter only to recommend that this conclusion should be made known to the appropriate officials of the Air Ministry in order that its application may be made certain in the future. It is right that I should add that the Petro-Flex Tubing Co., Ltd., have in every case since receipt of the letter of December 6, 1923, conformed strictly to its terms, and, further, that Imperial Airways, Ltd., were also unaware of the conclusion of the Research Department of the Air Ministry, and possibly when the machine was overhauled in November, 1924, only put back the same piece of tubing which had served in the same position before the engine was dismantled. I find as a fact that there is no ground for thinking that the absence of internal wiring in this piece of tubing was responsible for or contributed to the accident.

There was some cross-examination, but no evidence led to show that on the occasion of the accident the maximum authorised weight had been exceeded. I find that this was not so, and that the total weight was about 7,160 lbs., or some 40 lbs. below the maximum authorised.

Evidence has been given before me that the aerodrome at Croydon, especially with a south-west wind, is far from satisfactory. Colonel Edwards, the deputy director of air transport at the Air Ministry, has given detailed evidence of the steps which the Air Ministry propose by way of improving this aerodrome. It is proposed to add substantially to its present area, the additional land having been already acquired, and in order to make the land which has been acquired to the west available as part of the aerodrome, to divert Plough Lane, for which purpose a Bill is being prepared. These proposals are in general agreement with the suggestions for improving the aerodrome, made by the witnesses who gave evidence before me as to its unsatisfactory character. When Captain Stewart started, the wind was from south south-west and the day pretty rough, and although the unsatisfactory character of the aerodrome was not the primary cause of the accident, nevertheless it may have been to some extent responsible for its fatal result through the aircraft being lower than it otherwise might have been when the pilot found himself in difficulty.

The evidence as to what normally occurs with the wind from the south-west when an aircraft leaves the aerodrome at Croydon calls for some consideration. If it takes off upwind, the run on the ground is uphill, and after taking the air the aircraft has to surmount a hill rising in all to some 140 ft. above the starting point, and distant some 5,000 ft. therefrom. The crest of this hill is occupied in places by houses, rising, say, a further 40 ft. The evidence establishes that it is by no means unusual for aircraft, taking off in these circumstances, to be unable to pass at a safe height over the houses. Accordingly, the pilot has either to make a fairly sharp turn soon after leaving the ground, and this in breach of Paragraph 37 of Schedule IV of the Air Navigation (Consolidation) Order, 1923, or to take off across wind; each of these alternatives is undesirable. The evidence further shows that the margin of height at which aircraft pass over the portion of the crest of the hill which is unobstructed by houses is frequently very small; for example, in the case of type D.H.34, fully loaded, 50 ft., although under favourable conditions greater heights are attained. The aircraft G-EBBX is estimated to have been from 50 ft. to 100 ft. above the crest of the hill on December 24, and Captain Barnard, who estimated the height to have been 100 ft. above, said the machine had climbed "quite remarkably well." It was given in evidence that other types of machine have been observed to clear the crest of the hill with a margin even smaller than 50 ft. In view of these facts, the sufficiency of the angle of climb of aircraft habitually using the aerodrome at Croydon requires, in my opinion, further consideration, notwithstanding the contemplated alterations to that aerodrome.

The accident was attended with loss of life, because the aircraft made a spinning nose-dive from a height of about a hundred feet and struck the ground end-on at a comparatively high speed. The fact that the aircraft dived points to loss of control, due to its speed having fallen to the danger-point. It must be evident that every endeavour should be made to free aircraft carrying passengers from this type of loss of control. A pilot normally retains a speed considerably in excess of the stalling speed until the aircraft has been brought down to a very few feet above the ground, after which he keeps close above the ground whilst the speed is falling to the stalling speed; on stalling, the aircraft sinks to the ground and then runs along until it stops. The distance covered whilst flying close above the ground is a substantial part of the unobstructed space required for landing. In the case of a forced landing where the available landing area is small, the pilot is faced with the danger of a serious crash in his endeavour to reduce speed sufficiently. Other things being equal, the higher the stalling speed the greater the difficulty of making a forced landing on a small area without an accident. The type D.H.34 has an exceptionally high stalling speed, viz., 62 to 63 miles an hour. This type has, however, exceptional qualities in the matter of the short distance in which it stops after sinking to the ground, and in respect of its controllability at speeds slightly above the stalling speed. Each of these qualities offsets, in some measure, the adverse effect of the exceptionally high stalling speed. The accident, however, was rendered fatal by just such a loss of control as would follow upon a pilot reducing speed in the air to the danger-point. These considerations induce me to recommend that the Air Ministry should consider whether a limit should be fixed for the stalling speed of aircraft carrying passengers.

A point has been discussed before me, which in the circumstances is one of minor importance, as to the true meaning of paragraph 8 of Schedule II of the Air Navigation (Consolidation) Order, 1923. It has been submitted that Mr. Hinchliffe having landed at Lympne on December 23, the aircraft and its instruments should have been inspected there on the 24th, before the flight from Lympne to Croydon. The argument is not devoid of substance, as, the word "flight" in the paragraph not being defined, there is some consequent ambiguity, and I suggest that it is desirable to consider the advisability of re-drafting this paragraph, or otherwise making clear the meaning of the word "flight" therein.

It may be convenient that I should summarise the main conclusions to which I have come:—

(1) No official of the Air Ministry, or of Imperial Airways, Ltd., was in any way negligent in the discharge of his duties in relation to the aircraft G-EBBX.

(2) Capt. Stewart was a skilful and experienced pilot, and no blame is attributable to him.

(3) The dive to earth was due to loss of control combined with a stall, which occurred whilst the pilot was endeavouring to make a forced landing in circumstances of great difficulty.

(4) The flight of the aircraft for about half the time it was in the air was normal. Thereafter some defect developed, but whether in the engine or its installation, or otherwise in the aircraft, there is nothing to show.

(5) The aerodrome at Croydon is unsatisfactory. This was not the primary cause of the accident, and I do not say more than that it may have been a contributory cause.

(6) The total weight of the aircraft on its last flight was less by about 40 lb. than the maximum authorised.

(7) The Air Ministry should consider the question whether any and what limit should be fixed for the angle of climb, as also for the stalling speed, of aircraft carrying passengers.

(8) Every endeavour should be made to free aircraft carrying passengers from the danger of loss of control associated with stalling.

The Court does not make any order as to costs.

(Signed) ARTHUR COLEFAX.
(Signed) B. MELVILL JONES.
(Signed) J. SWINBURNE.

THE CROYDON DISASTER INQUIRY

THE Official Public Inquiry into the air disaster which took place at Croydon on December 24 was concluded last week at the Law Courts before Sir Arthur Colefax, the Chairman, and two assessors, Prof. B. M. Jones and Mr. J. Swinburne, F.R.S., M.Inst.E. The fifth sitting of the inquiry was resumed on January 29, when most of the evidence given was of a technical character. Mr. Mervyn Henry, traffic clerk at Croydon, was the first to give evidence, and he repeated the statement he made at the inquest in respect to overhearing Capt. Hinchliffe complain of the engine. Mr. G. W. Glasson, who directed the traffic in and out of Croydon by wireless, stated that he thought the flight of the machine G-EBBX when it started on the fatal flight was not quite normal. He further stated that soon after Capt. Barnard left (just after the accident) he received a message from that pilot reporting that the down draught over the ridge at Hill Crest was very severe, and asking would Imperial Airways load their machines lightly.

Colonel Frank Searle, Managing Director of Imperial Airways, described the system employed for the maintenance of aero engines and plant of the Imperial Airways.

He said he considered the system adopted by them was better than any he had seen in other countries. As regards the Petro-Flex tubing, he said that they had done one and a-half million miles with this tubing without discovering a single defect. The presence of the unarmoured piece of

tubing was explained by the fact that they were using up old stock, approved by the Air Ministry.

Mr. H. R. Ricardo, consulting engineer to the Air Ministry in 1917, and a member of the Engine Advisory Committee, said he did not consider there was any need for a test flight under normal conditions, although it was easy to overstrain an engine by too much ground testing.

Mr. Watson, representing the Air Ministry, went very carefully over the carburation conditions with Mr. Ricardo, and established that there was a critical point in the supply, when at one moment the supply was sufficient and the next was not, owing to a reduction in the petrol level in the carburettor. He thought it quite conceivable that the flight from Lympne to Croydon with a light load, and the short period of full throttle run on the ground, did not make such demands on the carburettor as to reduce the level to that critical point. Further, in the ground test the engine was under a heavier load than when in the air, which would mean that the revolutions would not be so high as when the machine got into the air.

The main points of the evidence at the resumed sitting on January 30 consisted of a statement by Col. F. F. Minchin, one of the pilots of Imperial Airways, to the effect that he considered Croydon Aerodrome a very bad one to take off from, and a report by Mr. Ricardo, in respect to some laboratory experiments with Petro-Flex tubing, in which it was not possible to reproduce the conditions as obtained in that part of the tube of the wrecked aeroplane. Mr. Hall, mechanical superintendent at Croydon, also answered several questions regarding the substitution of a piece of armoured tubing for unarmoured—in reference to which he stated he was unable to trace any record of the change—and the steps taken to test the engine when Mr. Hinchliffe reported on same.

The inquiry was resumed on January 31, when Major Cooper was recalled at the request of Mr. Wilfrid Lewis (representing Petro-Flex Tubing Co.), and said that he did not think it possible for water to get into the piping from the fire-hosing of the wreckage.

Mr. John Edye, general manager of the Petro-Flex Tubing Co., gave evidence as to having tested with heat pieces of piping similar to that which had been used on the air liner, and on the basis of his experiments propounded a theory that the condition of the gut in "the suspect piece" of piping was due to the heat of the flames in the disaster. Other than this witness could find nothing to account for the blockage.

Major Bulman, Chief Inspector of the Aeronautical Inspection Department of the Air Ministry, questioned by Mr. Trevor Watson in regard to engine tests, said that with a standard combination he would not normally expect to find in an air test any troulble of which there would be no symptom in a ground test.

Cross-examined by Mr. Beyfus, witness said there was nothing in the case of the aeroplane in question as presented in evidence before that inquiry that would suggest to him that there should have been a test flight before the machine started on its journey.

On February 2 the hearing of evidence was concluded, and the speeches of Counsel were opened. Final evidence was given by Maj. Brackley, who agreed that Croydon aerodrome was unsatisfactory when the wind was south-westerly. He said he had made suggestions to the Air Ministry with a view to improvements. Col. Edwards, of the Air Ministry, outlined a scheme of extensions and alterations which, when completed, would convert Croydon aerodrome into a satisfactory one.

Mr. Beyfus then addressed the Court on behalf of the relatives of Mr. Luxenburg, one of the victims. He submitted that the only finding possible was "that this disaster was due to the gross and culpable negligence of Imperial Airways." He submitted that it is clearly due to engine failure. After the engine trouble reported he held that it was culpable negligence to send out the machine with practically a full load, with a bad "take off" and in gusty weather.

Mr. Gilbert Stone (for the De Havilland Aircraft Co.) suggested that carburettor trouble was the cause of the disaster, and that negligence could be attributed to no one. It seemed clear that engine trouble, unforeseen by Capt. Stewart, brought about the trouble. "My clients," said Mr. Stone, "I feel that this deplorable accident has nothing to do with this machine. The D.H. 34 has flown 1,500,000 miles and has "got off" not fewer than 12,000 times, and, with the possible exception of trouble on one occasion at Cologne, we know of no case which could in any way be ascribed to failure to climb."

Mr. H. Gray (for Imperial Airways) complained of the violence and vituperation which Mr. Beyfus had given expression to. Mr. Beyfus said that Imperial Airways, Ltd., were guilty of gross and culpable negligence in the conduct of their work. One usually expected when such a charge was made that the question of negligence would be put to one or more of the witnesses called on behalf of the company accused. No witness had made any allegation as to the question of negligence.

He asked the Court to make a specific part of their report the definite statement that, so far as the Imperial Airways were concerned, they had done everything possible to avoid accidents. The charges were wholly unfounded, and he asked the President not to allow it to go out to the world that Imperial Airways had been guilty of gross or culpable negligence in the way they had conducted their onerous and exceedingly difficult business.

On February 3 Mr. Hunter Gray concluded his speech for Imperial Airways, and while agreeing that the actual cause of the accident must be a matter of speculation, argued that the one thing to be ruled out as a possibility was the question of a damaged engine.

Mr. W. Lewis (for the Petro-Flex Tubing Company) asked the Court to make it clear in their report that his clients had not placed a defective article on the market or had been guilty of any kind of negligence. He submitted that the result of the experiments with tubing subjected to fire and water proved conclusively that the condition of the tubing was the result of the fire, and not the cause of the accident.

Mr. Trevor Watson (for the Air Ministry) then addressed the Court. First the inquiry was in the main to elucidate the cause of that particular accident; secondly, it might have been that in the course of the inquiry circumstances were revealed which, while one might be certain that they had no connection with that particular accident, yet be such as to make it desirable for the Court to make some recommendations.

With regard to the suggestion that it was desirable that engineers at aerodromes abroad should be licensed, that was a question upon which the Air Ministry would be glad to receive any suggestions the Court might make, but he would call their attention to the fact that the Air Ministry had no control over foreign aerodromes as such.

Mr. Watson then dealt with the conditions governing civil flying in this country, and the criticisms regarding same made by Mr. Beyfus. He suggested that an examination of the evidence, and particularly Mr. Ricardo's, showed that the roughness referred to in the evidence was due to something wholly unconnected with the ultimate cause of the accident, and that it would be wrong to draw any inference founded upon the supposition that if the cause of the roughness had been detected and eliminated the accident would not have happened. Whatever the cause of the accident, it was a very unlikely cause, even an improbable one, because the Court had to find a cause consistent with these very remarkable factors—(1) the flight from Lympne to Croydon on unimpaired engine revolutions and power; (2) the successive ground tests at Croydon carried out in accordance with the best regulations for testing engines which could be devised; (3) the machine got off the ground successfully and continued to climb with reasonable success under conditions of ground and weather which certainly imposed a severe strain on machine and engine; and, finally, the presumed cause of the accident had to be consistent with the sudden return of the pilot in the direction of the aerodrome at a time when, according to the best observation, his difficulties were at an end. Only a very unusual concatenation of circumstances could have caused that accident, and he would remind the Court that Major Cooper's theory of a stoppage in the petrol supply put forward with the utmost reserve, was the only one consistent with the whole course of events from Lympne and upheld the view that a criticial period in the blocking of the petrol pipe might have changed the whole course of events.

The Chairman, in closing the inquiry, said that the Court was under a deep obligation to counsel for the assistance rendered. He and the assessors would visit the aerodrome before he gave his report.

An Italian World-Flight

MAJ. DE PINEDO, Chief of Air Staff in Italy, intends to attempt a flight round the world, starting probably about May. He will fly an S.16 flying boat, fitted with a 400 h.p. engine, and will be accompanied by a mechanic. The route will be *via* Athens, Egypt, Red Sea, along the south coast of Asia (India and Burma), Tokyo, Pacific Archipelago, and Sydney.

CORRESPONDENCE

The Editor does not hold himself responsible for opinions expressed by correspondents. The names and addresses of the writers, not necessarily for publication, must in all cases accompany letters intended for insertion in these columns.

THE RECENT CATASTROPHE AT CROYDON

[2088] Is it possible that the capillarity effect generally called the "Jamin effect" may have some bearing upon the recent catastrophe at Croydon?

Jamin discovered, many years ago, that a "chaplet of drops," that is to say, a series of air bubbles separated by water drops within a capillary tube, required a very great pressure to shift it along the tube. This phenomenon is explained in Poynting and Thomson's "Properties of Matter," on p. 142 of the 1913 edition (Griffin and Co.).

In 1919, on the occasion of the aeroplane catastrophe on the coast of Ireland, I made a few experiments in order to discover whether possibly a chain of water drops in a tube containing petrol might exhibit the same effect, and I found by preliminary experiments that the effect was considerable, a chain of 18 drops of water in a glass tube of 2 mm. bore, containing No. 1 Shell petrol, supporting a head of 14 cm. of petrol.

I have not been able to continue the experiments, but would suggest that a wide range of such experiments might disclose some important facts bearing upon the unexplained stoppage of flow in petrol supply pipes. The material of the inner walls of the pipe must affect the forces greatly, and possibly in a gut-lined pipe the effect may be so greatly enhanced as to become important in tubes of considerable bore.

It is not easy to introduce a chain of drops, but the presence of a filter of fine gauze on which drops of water can collect must, I think, facilitate the process under certain conditions of vibration.

F. M. DENTON, A.C.G.I., M.I.E.E.

Arosa, Switzerland.
February 3, 1925.

ROYAL AERONAUTICAL SOCIETY

(Official Notices)

ON Thursday, February 19, a joint meeting of the Royal Aeronautical Society and the Institution of Automobile Engineers will take place at the Society of Arts at 7 p.m., on which occasion light refreshments will be provided at 6.30 p.m. The subject of the paper will be "Light Aeroplane Engine Development," by Lieut.-Col. L. F. R. Fell, D.S.O., O.B.E.

It is regretted that Colonel Frank Searle has found it necessary to postpone his lecture on "The Maintenance of Commercial Aircraft," which had been arranged for February 12.

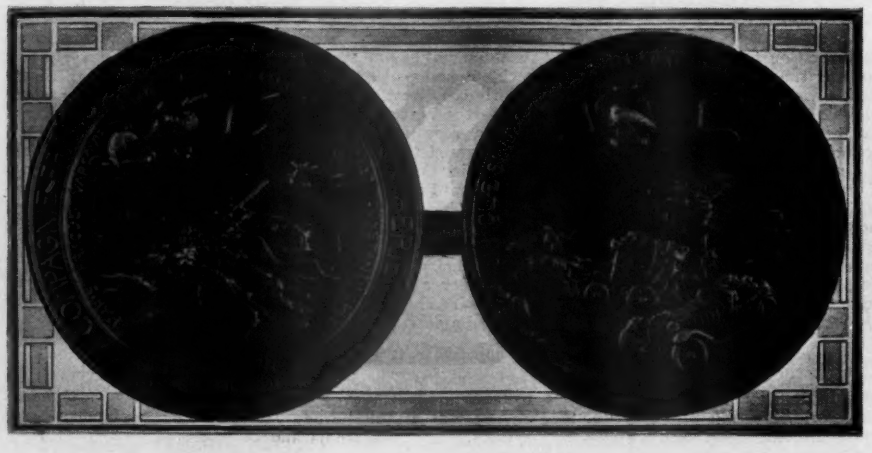
W. LOCKWOOD MARSH, Secretary

South African Air Mails

THE Postmaster-General announces that, beginning on Friday, February 13, and on each Friday thereafter until further notice, a new letter Air Mail will be despatched from this country by Union Castle Packet, for onward conveyance from Capetown by the experimental Air Mail service which the Union Post Office is about to institute between that place and Durban. The Mail aeroplane will be due to leave Capetown each Monday, beginning on March 2, immediately after the arrival of the Packet, and to reach Durban the same day calling on the way at Mossel Bay, Port Elizabeth and East London. It is to return from Durban (calling at the same points) in time to connect with the homeward Mail Packet sailing from Capetown each Friday. By the use of the Air Mail letters from this country for Mossel Bay, Port Elizabeth, East London and their respective districts, and for Durban and probably the whole of Natal, should be saved up to one or two days in time of transmission; and addressees in Durban should be afforded an interval from Tuesday to Wednesday, or to Thursday inclusive, in which to reply either by return ordinary, or by return Air Mail. Any letter intended for transmission by the Air Mail must bear in the top left-hand corner of the cover the official blue Air Mail label (or be plainly marked in manuscript "By Air Mail"), and must be prepaid in postage stamps in the usual way with a special fee of 6*d.* per oz. in addition to the ordinary Imperial rate of postage. It may be posted, subject to observance of these conditions, in any of the ordinary ways of posting; and it may be registered, but not insured. The latest times of posting (including late fee posting) for the new Air Mail will be generally as advertised for the ordinary post to South Africa, but there will be no late fee posting in London at Waterloo Station on Fridays for the Air Mail. Late fee letters must be prepaid with the appropriate late fee, in addition to the Air Mail fee.

"Wakefield" Scholarships and "Hyde-Thomson" Memorial Prize

THE Air Ministry announces that the "Wakefield" Scholarships amounting to £75 each have been awarded to Flight Cadets John Clarke and R. J. Drummond-Brown, and the "Hyde-Thomson" Memorial Prize, amounting to about £32, has been won by Flight Cadet C. W. Cooper. Flight Cadet Clarke obtained the first place among the aircraft apprentices recently selected for cadetships on completion of their three years' training at the School of Technical Training, Halton. Flight Cadet Drummond-Brown obtained the 8th place at the competitive examination held in November last for entry into the Royal Air Force Cadet College, Cranwell, and the first place on the list of candidates for the "Wakefield" Scholarship. Flight Cadet Cooper was the aircraft apprentice selected for a cadetship who passed out first on completion of his training at the Electrical and Wireless School, Flowerdown. It will be remembered that the "Wakefield" Scholarship was instituted in 1920 by Sir Chas. Wakefield, Bart., C.B.E. The "Hyde-Thomson" Memorial Prize was founded in 1919 by Mr. R. D. Hyde-Thomson for the promotion of proficiency in wireless telegraphy, in memory of his son, the late Lieut.-Colonel Douglas Hyde-Thomson, R.A.F., who was killed whilst flying on duty.



A "Franco-Roumaine" Souvenir: This handsome medallion is struck by the Compagnie Internationale de Navigation Aerienne in commemoration of the establishment of the air route between Paris, Prague, Vienna, Budapest, Bucharest, Constantinople Air Route. The machine depicted is obviously inspired by the Bleriot-Spad 33.

FLIGHT

FLYING IN AUSTRALIA

OWING to unavoidable absence, Mr. Bert Hinkler was unable to read his paper on "Flying in Australia" before the Institute of Aeronautical Engineers on Friday of last week, February 6. Mr. Hinkler was away at Manchester putting an Avro "Andover" through her paces, and in his absence the paper was very kindly read by Major F. A. de V. Robertson, who is London representative of our Australian contemporary, *Aircraft*. It is not, unfortunately, possible for us to publish Mr. Hinkler's very interesting paper in full, but a forthcoming issue of the Minutes of Proceedings of the I.Ae.E. will contain the entire paper, and readers are advised to obtain a copy of this publication.

The first part of Mr. Hinkler's paper was devoted to a brief account of the history of flying in Australia, beginning with a flight by Harry Houdini in 1910 on a Voisin biplane. He then followed with a brief sketch of meteorological conditions, and gave, perhaps, a somewhat terrifying impression of "Twisters," "Willi-Willies," "cock-eyes," etc., but pointed out that statistics showed that really bad gales occurred on an average only once every year. Following are extracts of some of the more interesting and important sections of Mr. Hinkler's paper, but many valuable passages have perforce had to be omitted.

Until early in 1921, civil aviation in Australia was entirely in the hands of enthusiastic and able young pilots who, when the war finished, sank their gratuities, etc., in the purchase of aeroplanes, mainly with a view to joy-riding. They started with high expectations, but, unfortunately, their hopes were dashed. People did not show the anxiety to fly with them that had been expected.

About this period there was an agitation for the Government to take a controlling interest in the administration of the business. It was realised by the Government that civil aviation had come to stay, and that although the early steps must necessarily be more or less halty, when it developed it would prove an enormous benefit to the Commonwealth, as this is a country of wide spaces and with more or less inadequate means of communication, and that even if the modified war machines of that period were not economical propositions in comparison with the cost per ton-mile of other forms of transport, yet it would be only a matter of time before aeroplanes become most formidable competitors to other forms of transport, or most beneficial auxiliaries thereto. It was palpably better for the well-being of the industry that public companies should own, organise and maintain the aerial service with at first a subsidy from the Government. It was therefore decided that tenders should be called for four aerial services, operating in all between 3,500 and 4,000 miles.

The first contract was let to a company in Western Australia, and this company has continued to grow and extend its activities, and has well maintained its lead in Australian aviation.

The second contract was let to a company in Central Queensland, some twelve months later, with a length of route of approximately 600 miles.

The third contract was let to a Melbourne company, to operate between Adelaide and Sydney, at about the same time as the Queensland contract was let, but the third service was not started until nearly two years later.

There was also a contract for a service between Sydney and Brisbane, which allowed the contractor the alternative use of flying boats, but this remains the only one still to make its inaugural flight.

The company operating the Sydney-Adelaide route commeced operations on June 2 last, their fleet consisting of a Sopwith "Wallaby," a Sopwith "Antelope," one "Gnu," a pair of "Doves," a D.H.4, a D.H. 9, and one Avro 504 K. A number of D.H. 50's have since been added.

This route with one exception is over a magnificent stretch of country. From Sydney to Goulburn it is not too good, and apparently there was a certain amount of anxiety in the preparation of that centre. The journey covers a distance of about 800 miles, and the contract calls for the service to be performed weekly in both directions.

The company operating in Central Queensland is usually known as "Quantas," the word being derived from their full title, Queensland and Northern Territory Air Services. The service they operate is a particularly useful one, and consists of linking up a number of railheads. Travelling between these dead-ends previous to the arrival of this company with their machines, was a most tiresome business, the old-type stage coach being the conveyance. Not only this, but the roads, or rather the tracks, used were somewhat crude and rough, so that a day's journey out in these parts fatigued one pretty badly.

This company opened its doors with two Armstrong-Whitworths (160 Beardmore), one Avro triplane (160 Beardmore), one Avro 504 (100 Sunbeam Dyak), one B.E.2e (90 R.A.F.), and one D.H.4, during September, 1922. Recently their fleet was improved by the addition of a number of D.H.50's.

The route Charleville-Cloncurry inclines one to use superlatives for its description. Ideal flying country, with vast stretches of open downs, level as a bowling green; an equable climate; a district blessed with prosperity considerably in excess of the average; large thriving townships unlinked by railway communications; immeasurable station properties (3,000 or 4,000 square miles being by no means uncommon) stretching away westward from the various railheads of Central Queensland; equally large districts split up into relatively small individual stations; some of them hundreds of miles from the nearest railway line, with main roads impassable during the wet season. In short, an air company's paradise.

The only trouble is the provision of wet-weather landing grounds, because during the wet season for sometimes weeks at a time, all land transport is held up owing to the boggy nature of the ground as well as floods.

The opening flight on this service began on November 2, when one of the Armstrong-Whitworths took off with the first mail, consisting of 108 letters for the town of Tambo, 105 miles distant. The first day's run finished at Longreach with 265 miles covered. The mail (which was promptly delivered to and by the Postmaster) included an exchange of stock returns between Charleville and Longreach agents within 16 hours of posting instead of six days as heretofore.

The following morning the continuation of the run was made to Cloncurry. On this occasion the company's first passenger was carried. This was one, Mr. Kennedy, owner of Buckingham Downs station, who has been a resident of Central Queensland for 53 years, and has passed his 86th birthday. His first trip to Cloncurry in the 'Seventies had occupied eight months. That was by pack horse; he had now done it in four hours.

The company now advertise passenger rates at 9*d*. per mile, and are also able to announce 160,000 miles flown, with an efficiency of 100 per cent. Full loads have become the rule rather than the exception, and no sooner had modern commercial aeroplanes appeared on the mail route than there arose a demand for passenger accommodation, far in excess of the contractors' present resources.

Quite apart from the mail trips which have been carried out in a manner satisfactory to all concerned, the company's taxiplanes were worked almost to a standstill in handling "flood traffic" during the February 20-March 14, 1924, inundations.

On relief flights covering nearly 2,000 miles, 56 passengers were carried in addition to heavy consignments of groceries, dairy produce, potatoes and other necessities including medicines and beer. In connection with this last item it is probable that the members of a certain sheering camp at Longreach had never before fully appreciated the amenities of air transport. First, the party of sheerers were flown over impassable roads to the West Longreach sheds. Next, as a happy afterthought the enterprising licensee of the West Longreach Hotel imported by taxiplane a special load of beer, whisky and rum, weighing over 2 cwt. Commenting thereon the local newspaper observes "It is quite probable that this last-mentioned exploit will advertise Quantas more than anything else it has done in its short but successful career." The same paper acclaims Quantas as "the pride of the Central West." The returns also refer to 36 passengers ferried across the flooded Thompson river, which was running five miles wide.

The West Australian Company has now been in operation since the later part of 1921. The length of route is 1,500 miles between termini, and making a total of 3,000 weekly return trips they can claim to have the longest passenger-carrying airway in the world. The service originally operated between Geraldton and Derby with calls at Carnarvon, Onslow, Roeburne, Port Hedland, and Broome. About twelve months ago the route was extended south to Perth. There is also every hope for a further extension in the north, adding another 560 miles from Derby to Wyndham, thus bringing the total length of the North West Airway to something over 2,000 miles. To appreciate what this means to us over on this side, an airway of similar length operating from London would

reach as far as Alexandria. Upon a review of the figures and performances for a period of 12 months to June, 1924, the Controller of Civil Aviation congratulated the company upon maintaining 100 per cent. efficiency for the whole period.

In comparing flying conditions in Australia with those in England, it is only necessary to mention that the greatest troubles in England are practically non-existent in Australia. I refer now to fogs and snow-storms, etc., with which we are harassed during a fair number of the winter months, whereas in Australia, and particularly Queensland and Western Australia, the whole length of the aerial route flown over is 95 per cent. clear. When clouds are met with they are usually cumulus clouds, ranging from 2,000 ft. upwards. At certain times of the year, largely in mid-summer, bad storms are liable to be met with, and these storms cause considerable damage to property and are a menace to shipping on the coast, but ample warning is given of their approach.

Regarding the West Australian air route, the country flown over is comparatively flat, with hills of only a few hundred feet altitude to be crossed, and these in very isolated places. The length of route is served by an overland telegraph line, and each aeroplane carries as part of its equipment a field telephone which can be brought into immediate use in case of forced landings. By means of a direct line between the central post office in the city of Perth and the headquarters of the Airways Company, almost direct communication is established between a pilot suffering a forced landing and the head office of his company. As machines are traversing a route that is very sparsely populated and very often no habitation or signs of civilisation is seen for 50 miles at a stretch, what this telephonic and telegraphic communication means to the aerial service can readily be imagined. The privilege of cutting in on the telegraph line has been extended to the company by the Post Master General's department on condition that it is not abused. When information was asked by the Controller of Civil Aviation regarding the number of times this privilege had been made use of in two years' operations, the fact was elicited that only on seven occasions in this period had the use of this privilege been necessary.

The regularity and efficiency of the West Australian service can be attributed to several causes. Apart from the very fine climatic conditions, visibility often being 100 miles, and the suitability of their route for forced landings, there is the selection and training of the pilots and mechanics employed in the service and the exceptionally fine maintenance work carried out on the machines. It is interesting to know that no pilot is employed in the service until he has undergone a refresher course at the hands of the company itself, no matter what the pilot's previous experience in flying may have been. The value of this refresher course is considerable in that it has been the means of eliminating faults that are possessed by quite a number of very experienced pilots, the methods of teaching being such that a really sound commercial pilot is turned out. The same applies to the mechanics, who, in spite of previous experience, are required to go through a course of training and observation at headquarters depôt before taking up any work at other depôts or carrying out any work on their own account. The freedom from forced landings has been largely due to these methods.

The inspection of machines and engines and also the inspection of personnel is carried out by the Department of Civil Aviation in Australia, and their reports are such that the West Australian Company can rightly claim a prominent position in the world of aerial transport. Their fleet consists of six Bristol tourers, three-seaters fitted with Puma engines, two D.H.50's, and one Avro 504K fitted with Gnome mono engine, which is used for refresher courses and testing purposes.

The average daily mileage flown by each machine is just over 500, and passengers can traverse the length of the route either way in 2¼ days. Most of the trips between stopping places are between 200 and 300 miles in length, so that an aeroplane has quite a useful carrying capacity and the necessity for re-fuelling can be concentrated at main depôts.

The only competition met with is a slow and erratic service of steamers which take over seven days to traverse the same length of route, while ports of call and dates of departure are most uncertain. The number of letters carried by this service has grown from a mere handful to over 18,000 letters per month. These letters are surcharged at 3*d*. per ½ oz. in addition to the ordinary postage, and the revenue received by the Department from this small surcharge amounts to over £2,500 sterling per annum.

Before the inauguration of the aerial mail service it was quite the usual thing for merchants in Perth to receive replies to letters posted to England before they received replies to letters posted to ports on the north-west coast of their own state. This speeding-up of mails has been a very big factor in encouraging the mail traffic, and also the passenger traffic has grown considerably, although it is seasonable.

The operations of the West Australian Co. have been so successful that the 12-monthly contracts originally entered into for the first two years have now been supplemented by a three-years' contract with the Federal Government.

It will not be long before Australia is completely encircled with regularly operating aerial mail routes, and from these routes will radiate other routes to inaccessible and out-back townships, which at present suffer considerably from lack of communciations.

Concerning his own experience of flying in Australia, Mr. Hinkler said: "It was in March, 1921, just about the opening date of the Sydney Royal Show, that I arrived in Sydney with the Avro Baby. The machine was immediately sought after by the Australian Aircraft and Engineering Co., the only exhibitors of aircraft, upon whose stand it was placed on exhibition for the week. Here it claimed the particular attention of thousands of country visitors. The stand, it should be noted, was simply a roped-off space with no protection at all from the burning sun by day and the heavy dew by night. The week following the show the heavens opened and let down great quantities of rain. Fortunately for the location of the hangar at Mascot it remained an island, whilst to reach it across the aerodrome I had to wade in halfway up to my knees. Here the Baby was erected, and I made some flights round Sydney to satisfy myself of the consumption and performance in the atmosphere of Australia. Just before dawn on April 11 the Green engine responded to an initial movement of the propeller, and with the only person in the vicinity, a night watchman who was still asleep, I made my departure. Taking a direct course, my route lay for many miles right up the centre of the great dividing range, the highest point passed over being Ben Lomond, 5,000 ft. On approaching the mountains I managed a snap-shot or two, which shows the appearance of this part of the country. Heavily timbered and practically uninhabited for miles, the hills in the picture range between 3,000 and 4,000 ft. For about 100 miles after taking this picture the same kind of country lies ahead. I do not remember seeing even one solitary house, and certainly nothing in the way of a road. After meeting the main Sydney-Brisbane railroad running along the tableland, the country becomes fairly open. "Another picture which I secured shows one of the small towns in this district, and is typical of the country town in Australia. Soon after 10 o'clock cumulus clouds forming hid most of the ground from view, and it was not until I had crossed the border into Queensland for some distance that I once more had the sky to myself. After passing Towoomba almost until I reached my destination there is a recurrence of the heavily timbered mountainous country. Nothing but wild forest as far as the eye can reach. Somewhere on this final 200 odd miles I crossed a solitary railway, which is practically the only man-made landmark to pick up. On reaching Bundaberg I found that the small allotment known as the Foundry Green had not been built on during my long absence, and fortunately I had the total space of approximately three acres to myself. On landing without dismounting I ruddered round and taxied along the street, finally pulling up at the front door. From the time the machine left the shelter of the Mascot hangar until its return about three weeks later, it was exposed to all the elements, the best protection it had during that period being that offered by a friendly gum tree."

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The Rotor Patented in Great Britain

IN connection with the attention now being devoted to the rotor as applied to flying, it is of interest to note that two Englishmen, W. C. Scotter and C. R. Scotter, patented the rotor as a means of obtaining lift as long ago as 1915, their patent being No. 17,981, and accepted on February 26, 1917. Previously the two brothers had patented rotating lifting vanes of s-section, or, rather, having a pronounced curvature to the trailing edge. We are informed that the necessary annual patent fees have been paid, and that therefore the two patents are still in force. Those interested in the application of rotors to flying machines should communicate with Mr. W. C. Scotter, Victoria Chambers, Bowlalley Lane, Hull.

FLIGHT

THE ROYAL AIR FORCE

London Gazette, February 3, 1924

Royal Air Force

Group Capt. A. L. Godman, C.M.G., D.S.O., is appointed Deputy Director of Manning, Air Ministry; Jan. 26 (*vice* Group Capt. P. B. Joubert de la Ferte, C.M.G., D.S.O.).

General Duties Branch

Flight Lieut. S. H. Wallage, M.C., is granted a permanent commn. in rank stated; Feb. 4. L. A. Walsh is granted a short service commn. as a Pilot Officer on probation, with effect from, and with seniority of, Jan. 17. Lieut. A. W. Henderson, R.A., is granted a temp. commn. as a Flying Officer, on seconding for four years' duty with R.A.F.; Jan. 17. The follg. Flying Officers are granted the honorary rank of Flight Lieut., Jan. 8:—H. W. A. Fox (Lieut., R.N., retd.); R. W. M. Hall (Capt., Indian Army, retd.); E. H. D. Spence (Lieut., R.N., retd.); L. P. Winters (Capt., Indian Army, retd.); F. W. Wiseman-Clarke (Lieut., R.N., retd.).

The follg. Pilot Officers on probation are confirmed in rank:—H. W. P. Stewart; Dec. 18, 1924. C. Clarkson, J. T. C. Skellon, C. V. Williams; Dec. 30, 1924. Flight Lieut. D. Gilley, D.F.C., is restored to full pay from half-pay; Jan. 16. Sqdn. Ldr. R. P. Whitehead is placed on retired list; Jan. 21. Flying Officer G. F. Embrey Harrison is transferred to Reserve, Class A; Feb. 4. The follg. resign their short service commns, Feb. 4:—Flying Officer T. B. R. Meadmore (Capt., Indian Army, retd.); Pilot Officer I. B. Gray. The short service commns. of the follg. Pilot Officers on probation are terminated on cessation of duty, Feb. 4:—L. R. Gladwin-Errington, D. W. J. Meagher.

Stores Branch

Flying Officer H. Parker is placed on half-pay, Scale B, from Jan. 31 to Feb. 15, inclusive.

Accountant Branch

Flying Officer R. W. Leamon resigns his short service commn.; Feb. 4.

Medical Branch

Flight Lieut. C. McC. Jones, M.A., is transferred to Reserve, Class D.2 Feb. 4.

Reserve of Air Force Officers

H. M. Samuelson is granted a commn. in Class BB, General Duties Branch, as a Pilot Officer on probation; Feb. 3. Flying Officer J. G. Hay is confirmed in rank; Jan. 29. The follg. Pilot Officers are transferred from Class A to Class C; Feb. 3:—V. H. E. Baker, H. D. Clevely.

ROYAL AIR FORCE INTELLIGENCE

Appointments.—The following appointments in the R.A.F. are notified:

General Duties Branch

Group Captain A. L. Godman, C.M.G., D.S.O., to Air Ministry on appointment as Deputy Director of Manning; 26.1.25.

Wing Commander W. H. Primrose, D.F.C., to R.A.F. Depot, whilst on temp. duty in the United Kingdom; 8.1.25.

Squadron Leaders: F. J. Linnell, O.B.E., to R.A.F. Depot (Non-effective Pool); 22.1.25. J. L. Vachell, M.C., to Air Ministry; 2.1.25.

Flight Lieutenants: V. R. Scriven, A.F.C., to H.Q., Iraq; 1.1.25. W. L. Fenwick, to No. 5 Armoured Car Co., Iraq; 1.1.25. S. L. G. Pope, to H.Q., Egypt; 27.12.24. C. E. H. C. Macpherson, to Air Ministry; 24.1.25. A. L. Paxton, D.F.C., to Air Ministry; 1.3.25. W. E. Theak, to No. 12 Sqdn., Andover; 13.2.25. E. S. Ades, to Sch. of Naval Co-operation, Lee-on-Solent; 2.2.25. C. J. W. Hatcher, A.F.C., to Armament and Gunnery Sch., Eastchurch; 16.2.25. J. R. Bell, D.F.C., to Station H.Q., Northolt; 3.2.25.

Flight-Lieutenants.—A. C. Sanderson, D.F.C., to No. 5 Sqdn., India, instead of to No. 31 Sqdn. as previously notified; 27.11.24. R. S. Sorley, D.S.C., D.F.C., to Aeroplane and Armament Experimental Estab., Martlesham Heath; 7.2.25. H. Bligh, to Inland Area Communication Flight, Northolt; 12.2.25. J. R. I. Scambler, A.F.C., to No. 1 Wing H.Q., Farnborough; 31.1.25. E. J. D. Routh, to Sch. of Army Co-operation, No. 16 Sqdn., Old Sarum; 16.2.25. E. I. Bussell, to No. 11 Sqdn., Netheravon; 16.2.25. J. McFarlane, M.C., to Boys' Wing, Cranwell; 16.2.25. T. Henderson, M.C., A.F.C., to No. 5 Flying Training Sch., Sealand; 4.2.25. R. P. M. Whitham, M.C., to R.A.F. Depot, on transfer to Home Estab.; 17.1.25. C. W. Hill, to R.A.F. Depot, on transfer to Home Estab.; 17.1.25. Do., to Sch. of Army Co-operation (No. 16 Sqdn.), Old Sarum; 21.2.25. H. J. Collins, to Station H.Q., Kenley; 16.2.25. E. P. Roberts, M.C., D.C.M., to No. 14 Sqdn., Palestine; 27.12.24. H. S. Scroggs and E. F. Turner, A.F.C., to R.A.F. Depot, on transfer to Home Estab.; 28.12.24. E. O'D. Crean, to No. 2 Armoured Car Co., Palestine; 27.12.24. B. D. S. Tuke, A. P. M. Sanders, J. S. Windsor, M.C., A. G. Jarvis, A.F.C., and J. Blackford, to R.A.F. Depot, on transfer to Home Estab.; 17.1.25. W. R. B. Annesley, to R.A.F. Depot, on transfer to Home Estab.; 3.1.25.

Flying Officers: C. D. Pyne, to Aircraft Depot, Egypt; 1.1.25. H. J. T. Russell and R. H. S. Mealing, to No. 216 Sqdn., Egypt; 27.12.24. A. Page, to Stores Depot, Egypt; 16.12.24. H. R. McL. Reid, D.F.C., and T. B. Bruce, M.C., to No. 208 Sqdn., Egypt; 27.12.24. (Hon. F/Lieut.) R. H. Stewart Peter, to No. 6 Sqdn., Iraq; 21.1.25. (Hon. F/Lieut.) L. S. Ingle, M.C., to No. 31 Sqdn., India; 1.1.25. F. M. Rooth, to No. 31 Sqdn., India; 29.12.24. C. Lloyd, to No. 14 Sqdn., Palestine; 5.1.25. G. H. Bennett, to No. 31 Sqdn., India; 21.1.25. A. W. Henderson, to No. 4 Flying Training Sch., Egypt, on appointment to Temp. Commn. on being seconded from the Army; 27.1.25. A. R. Hamilton, to No. 2 Flying Training Sch., Digby, on appointment to a Temp. Commn. on being seconded from the Army; 17.1.25. (Hon. F/Lieut.) B. H. Godfrey, I. E. Brodie, and C. W. McK. Thompson, to Armament and Gunnery Sch., Eastchurch; 16.2.25. H. W. Westaway, to No. 1 Sch. of Tech. Training (Boys), Halton; 11.2.25. N. V. Moreton, to School of Army Co-operation, No. 16 Sqdn., Old Sarum; 15.2.25. L. G. Nixon, to No. 9 Sqdn., Manston; 4.2.25. C. J. Collingwood, to Sch. of Army Co-operation, No. 16 Sqdn., Old Sarum; 12.2.25. J. B. H. Rogers, to Station H.Q., Bircham Newton; 1.2.25. F. E. Bond, to Armament and Gunnery Sch., Eastchurch; 19.1.25.

Pilot Officers: H. G. Slater and F. T. Stacey, to No. 47 Sqdn., Egypt; 1.1.25. G. R. A. Pallin, to No. 14 Sqdn., Palestine; 5.1.25. A. O. Pollard, V.C., M.C., D.C.M., to No. 5 Flying Training Sch., Sealand; 29.1.25. C. R. Hancock, J. H. Powle, C. H. Tighe, and A. H. Wheeler, to No. 2 Flying Training Sch., Digby, on appointment to Perm. Commns.; 17.1.25.

The following Pilot Officers are posted to No. 2 Flying Training Sch., Digby, on appointment to Short Service commns. (on probation); 17.1.25:—R. D. Adams, E. Addis, C. A. Bell, R. L. Burnett, J. G. Chamberlain, E. L. Drew, T. D. Egan, S. A. V. Evans, W. E. Fleming, D. S. Green, A. J. Holmes, N. K. Howard, C. M. Inglis, F. M. Kellaway, H. W. Miller, W. L. Mummery, J. C. Noel, L. F. T. Price, J. H. C. Purvis, A. F. Satchwell, D. C. Shaw, E. Stanier, C. P. Vines, L. A. Walsh, and D. R. Way.

Married

W. F. LANGDON, R.A.F., was married on January 23 to ENEID M. E. PLATT, daughter of Mr. and Mrs. E. Platt, of Gorddinog, Llanfairfechan.

WM. DUFF MILLER, M.B., Ch.B., Flight-Lieut., R.A.F., M.S. Reserve, eldest son of R. Miller, Esq., Travancore, South India, was married on January 29, quietly, in Kensington, to MURIEL, only daughter of the late A. K. WALLACE, Esq., and Mrs. WALLACE, of Broadstone, Dorset.

To be Married

A marriage has been arranged, and will take place in Malta in April, between Flight-Lieut. R. STANLEY AITKEN, M.C., A.F.C., R.A.F., only son of Mr. and Mrs. Robert Aitken, lately of Stanmore, Middlesex, and ENA, only daughter of the Rev. D. JACKSON TWEEDIE and Mrs. TWEEDIE, The Manse, Stitchel, Roxburghshire.

The engagement is announced between Flight.-Lieut. ROWLAND JOHN DIVERS, M.B.E., R.A.F., and Miss RUTH ELLWOOD, only daughter of Mr. and Mrs. O. T. ELLWOOD, of Sealand Bank, Queen's Ferry, Flint.

The engagement is announced between Flight-Lieut. H. W. EVENS, R.A.F., eldest son of Mr. and Mrs. W. Evens, of Westcliff-on-Sea, and JEAN, youngest daughter of Capt. and Mrs. RALPH WHITEHEAD, of Blyth, Northumberland.

The engagement is announced between Flight-Lieut. HERBERT CARMICHAEL IRWIN, A.F.C., R.A.F., second son of the late Thomas Francis Nesbitt Irwin, Donnybrook, Dublin, and Mrs. Irwin, Fron Deg, Rhos Neigr, Anglesey, and OLIVIA MARJORY MACDONALD, daughter of Dr. and Mrs. CHAS. C. TEACHER, Hollington, Fareham, Hants, and formerly of Craigend, North Berwick.

The betrothal is announced of EDWARD H. MARSHALL, of Calcutta (late Captain, R.F.C.), son of E. J. Marshall, of 61, Harley House, N.W.1, and grandson of James C. Marshall, Albury, Eastbourne, to MADELEINE, youngest daughter of the late A. T. SHUTTLEWORTH, Conservator of Forests, Bombay, and Mrs. SHUTTLEWORTH, 18, Cleveland Square, W. 2. The marriage will take place at Bombay during March.

Items

ERNEST GEORGE FENTON HALL, of the "Heart of Amazonia Mission" and late R.G.A. and R.A.F., who died of fever on December 15, 1924, alone amidst a tribe of Guajajara Indians in the Amazon Valley, was the younger son of E. F. Hall, J.P., and of Grace Hall, formerly of Westport Lodge, Westport, Ireland. Mr. Hall, whose age was 25, was in 1922 the Officers' Heavy-weight Boxing Champion, R.A.F.

Air-Marshal Sir John and the Hon. Lady SALMOND arrived at 60, Brompton Square, S.W. (Telephone, Kensington 761), on January 23. This will be their address for several months until they move into their new house in York Terrace, Regent's Park.

AIR POST STAMPS

By DOUGLAS B. ARMSTRONG

Canadian Air Stamps

A SECOND semi-official air stamp has now been issued in connection with the daily air mail service between Haileybury, Ont., and Rouyn Township *via* Angliers, which has been operated by the Laurentide Co. under Government authority since September 1, 1924. It is of the same denomination as before, *viz.* 25 cents., but printed in red and of a more elaborate design, showing an aeroplane flying over the mountains with the rising sun in the background, the work of Mr. J. M. Meekison. The inscriptions read "SPECIAL AIR DELIVERY—CANADA, 1924—LAURENTIDE AIR SERVICE, LTD." The stamp is supplied either in booklets of eight, price $2, or sheets of 20, price $5. The initial printing of 4,500 stamps was carried out by the Dodd-Simpson Press, Ltd., with the aid of dies produced by the British and Colonial Press, Ltd. By arrangement with the Dominion Post Office all letters, etc., must be fully prepaid in regular Canadian postage stamps, the special label representing the air post fee being affixed on the *backs*. The first issue, as previously noted, was a green stamp, without special design, and separated by means of a roulette, in lieu of the usual perforation.

A special souvenir label was also affixed to letters carried by air from Estevan to Winnipeg on October 1, 1924, in a design by Mr. Donald Dunbar, editor of the Estevan *Mercury*, depicting an aeroplane in the clouds over the town with a section of a coal mine and a miner at work beneath it. The vignette bears the words "First Saskatchewan Aerial Mail—Estevan, Winnipeg, October 1, 1924," the total number sold being 1,128, of which the greater proportion were used on the mail of 1,926 letters, etc., handed to the aviator, Flight-Lieut. E. A. Alton, for conveyance. Unfortunately the journey was not completed as the machine crashed when only ten miles from the starting point.

Mystery Air Stamp.

A CONTINENTAL stamp journal chronicles with all reserve a hitherto unrecorded set of Costa Rican air post stamps, which appears to have been issued in May last. It consists of the 1 centimo postage stamp in the type of 1910 (San Maria Monument) overprinted with the device of an aeroplane within a double-lined rectangular frame in red, together with the inscription "CORREO AEREO, 1924," and the following values in surcharge: 8, 16, 32, 64 cts. and 1 COLON. The postmark is circular in form and contains the words "SAN JOSE-LIMON-CORREO AEREO, Mayo 1A, 1924." Assuming the issue to be authentic it is curious that nothing has been heard of it by air post specialists until seven months after its appearance. Inverted overprints are said to exist.

Air Post History in the Making

HISTORIC flights that have furnished valued material for the air post collection during the past year in the form of flown covers with distinguishing cachets or postmarks, are the American round-the-world flight, the Dutch flight from Amsterdam to Batavia, the Junker flight from Berlin to Angora, the Trans-Atlantic flight of the dirigible Z.R.3 and the first trip over the U.S.A. Trans-Continental air mail route on July 1, 1924.

Several flights of lesser importance are also denoted by special marks or cachets, including Buenos Ayres-Montevideo, Berlin-Stockholm night flight, Constantinople-Paris (October 20), Estevan-Winnipeg (uncompleted), and the Dayton International air races. Amundsen's projected flight to the North Pole failed to materialise, so that the special souvenir stamps and cards prepared were not put into use.

Air post stamps of a semi-official character were issued for the first time in Canada by the Laurentide Air Service, Ltd., by permission of the dominion Postal Authorities. A recrudescence of special vignettes in connection with flying days in different parts of Switzerland was not untainted with a suspicion of speculative origin, and led to publication of an official disclaimer by the Swiss post office, calling attention to the unauthorised nature of these *soi-disant* "stamps."

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The Schilovsky Turn Indicator

WE have been asked to state that enquiries relating to the Schilovsky gyroscopic turn indicator described and illustrated in our issue of January 29, 1925, should be addressed not to Bncknall and Riches, of 8, Southampton Row, but to Aircraft Patents, Ltd., of 4, Broad Street Place, London, E.C.2, who hold the sole manufacturing and selling rights for this invention.

PUBLICATIONS RECEIVED

Technical Notes: *No.* 205.—The Logarithmic Polar Curve. By V. Cronstedt. October, 1924. *No.* 206.—Structural Weight of Aircraft as Affected by the System of Design. By C. W. Hall. November, 1924. *No.* 207.—The Simplifying Assumptions, Reducing the Strict Application of Classical Hydrodynamics to Practical Aeronautical Computations. By M. M. Munk. November, 1924. *No.* 208.—Tests on Duralumin Columns for Aircraft Construction. By J. G. Lee. November, 1924. U.S. National Advisory Committee for Aeronautics, Navy Building, Washington, D.C., U.S.A.

Calendar, 1925. Palmer Tyre, Ltd., 119-123, Shaftesbury Avenue, London, W.C. 2.

Transactions. December, 1924. *Vol.* LXVIII, *Part* II. Institution of Engineers and Shipbuilders in Scotland, Elmbank, Crescent, Glasgow.

The Air Pilot Monthly Supplement. No. 3. *January*, 1925. Air Ministry, Kingsway, London, W.C. 2.

Catalogue of Aeronautical Collection in the Science Museum, South Kensington. Compiled by M. J. B. Davy. 1924. H.M. Stationery Office, Kingsway, London, W.C.2. Price 1s. net.

The Law Relating to the Air. By R. B. Sparkes, M.C., F.R.G.S. Stevens and Sons, Ltd., 119-120, Chancery Lane, London, W.C. Price 3s. 6d. net.

Revue Juridique Internationale de la Locomotion Aérienne. December, 1924. Edition Aérienne, 4, Rue Tronchet, Paris.

Illustrated Calendar for 1925. The Blackburn Aeroplane and Motor Co., Ltd., Olympia, Leeds.

Aeronautical Research Committee, Reports and Memoranda: No. 925 (*E.* 11).—An Improved Model of Optical Indicator. By W. J. Stern and H. Moss. October, 1924. Price 1*s.* 6*d.* net. *No.* 931 (*E.* 12).—The Friction of Pistons and Piston Rings. By T. E. Stanton. July, 1924. Price 4*d.* net. H.M. Stationery Office, Kingsway, London, W.C.2.

* * * *

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AERONAUTICAL PATENT SPECIFICATIONS

Abbreviations: Cyl. = cylinder; i.c. = internal combustion; m. = motor. The numbers in brackets are those under which the Specifications will be printed and abridged, etc.

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Published February 12, 1925

22,541. D. J. MOONEY. Ribs, cross-members, etc., for aircraft. (227,482.)
27,152. ARMSTRONG SIDDELEY MOTORS, LTD., and S. M. VIALE. Valve-operating gear for fluid-pressure engines with radially arranged cylinders. (227,549.)
27,153. ARMSTRONG SIDDELEY MOTORS, LTD., and S. M. VIALE. Apparatus for filtering liquids. (227,550.)
27,768. A. ROHRBACH. Wings for metal airplanes. (206,514.)
27,769. A. ROHRBACH. Tanks for carrying liquids on aircraft. (206,515.)
30,856. SCHNEIDER ET CIE. Landing carriages for aircraft. (224,486.)

APPLIED FOR IN 1924

Published February 12, 1925

8,792. SOC. DU CARBURATEUR ZENITH. Device for automatic altitude control of carburettors. (214,241.)
21,285. SOC. ANON. DES AVIONS M. WIBAULT. Surfaces or parts of aeroplanes. (221,803.)

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